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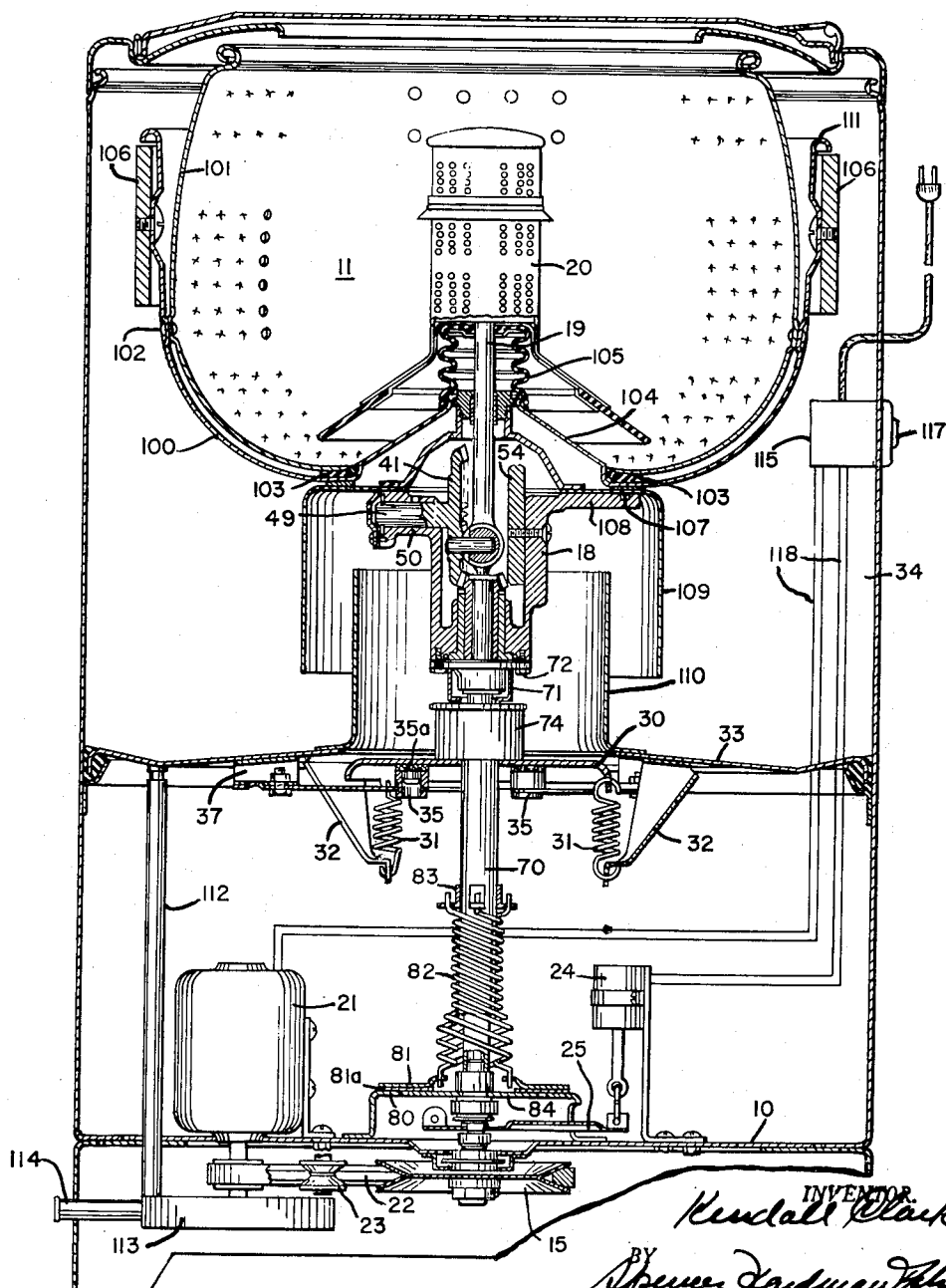
K. CLARK
WASHING MACHINE

2,618,141

Filed April 24, 1947

3 Sheets-Sheet 1

FIG. 1



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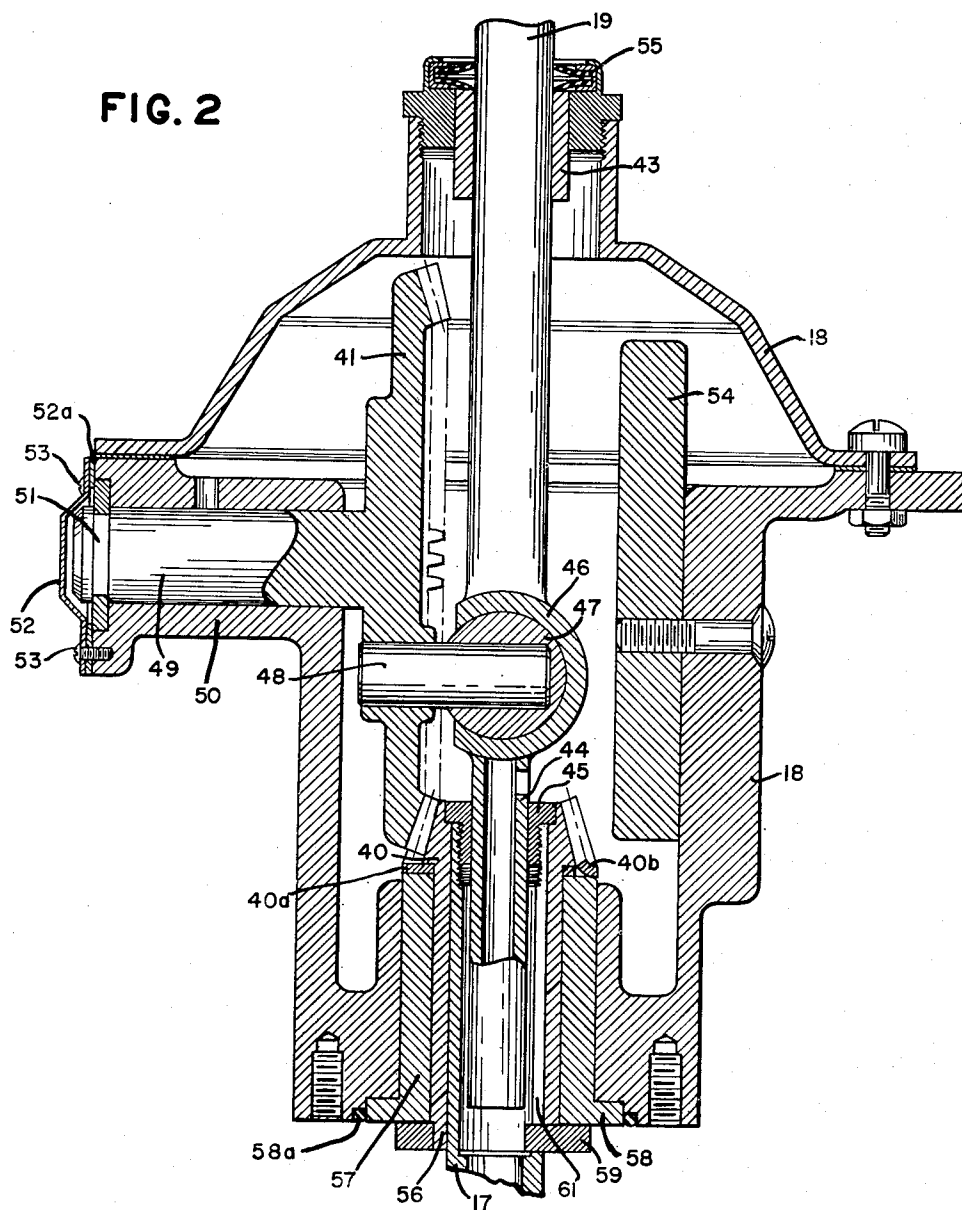
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FIG. 2



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FIG. 3

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2,618,141

WASHING MACHINE

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6 Claims. (Cl. 68—23)

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This invention relates to domestic appliances, and more particularly to washing machines.

An object of this invention is to provide a washing machine of simplified form, which is, preferably, automatic in its operation, and which may be built economically.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a vertical cross-section of the washing machine;

Fig. 2 is an enlarged vertical cross-section of the rotary-reciprocating mechanism;

Fig. 3 is an enlarged vertical cross-section, partly broken away, of the lower portion of the drive means;

Fig. 4 is a cross-section taken along the line 4—4 of Fig. 3;

Fig. 5 is a plan view of one of the members shown in Fig. 3; and

Fig. 6 is a plan view of another of the members shown in Fig. 3.

A washing machine, according to my invention, may include a base 10 upon which the tub 11 is supported by a rotatable shaft construction, such that the tub may gyrate about its support without imparting vibrations to the floor.

To this end, the base 10 may carry a resiliently mounted thrust bearing 12 carried by a rubber-like washer 13. A pulley drive shaft 14, to which a pulley 15 is keyed at 16, is mounted and carried by the thrust bearing 12. This pulley drive shaft 14 is keyed to a hollow vertical rotatable shaft 17, which supports the gear casing 18 at its upper end. The gear casing, in turn, supports the tub 11. A vertically reciprocable shaft 19 extends from the gear casing 18, and is secured to an agitator 20 at its upper end. A motor 21 drives the pulley 15, through the medium of belt 22, which is maintained taut, if necessary, by the idler pulley 23, which is suitably spring-pressed by well known spring means not shown. The construction is such that the motor 21 rotates the pulley 15, and the tub 11 is rotated along with the agitator 20, under certain conditions, or the tub 11 is maintained stationary, and the agitator 20 is vertically reciprocated under other conditions. These conditions are determined by the energization or deenergization of the solenoid 24, which raises or lowers the lever 25, to actuate the combined brake and clutch means 26, to select agita-

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tion or rotation, in a manner to be hereinafter described more fully.

Means are provided to maintain the shaft construction resiliently vertical. To this end, the vertical shaft construction is connected to a spring platform 30. A plurality of springs 31 are connected at one of their ends to the platform 30, and at the other of their ends to rigid supporting brackets 32 carried by an intermediate water trough 33, secured to the cabinet 34. The cabinet 34 may be a wrapped metal sheet mounted on base 10. The springs 31 have sufficient tension to maintain the shaft construction in a substantially vertical position; but allows gyrations, if necessary.

Damping means are provided, for the shaft construction, in the form of a plurality of snubbers 35, having friction pads 35a, and carried by upwardly stressed leaf springs 36, secured to the trough 33 by brackets 37. The snubbers 35 have frictional contact with the bottom of the spring platform 30, and tend to dampen any gyrations set up by unbalance in the clothes within the basket 11.

The gear casing 18 contains a rotary-reciprocating, or back and forth, gear construction to impart the required motion to the shaft 19 and agitator 20. The hollow rotatable shaft 17 carries a beveled gear 40, at its upper end. The gear 40 engages a horizontal axis, beveled gear 41, which is provided with a Scotch yoke connection with the shaft 19 to impart vertical reciprocation thereto. The shaft 19 has a bearing 43 at the upper end of casing 18, and has a lower extension 44 provided with a bearing 45 within the hollow shaft 17. This maintains alignment of the shaft 19.

The Scotch yoke construction includes a horizontal hollow cylinder 46, secured to shaft 19, within which a solid cylinder 47 may reciprocate horizontally, and within which a horizontal pin 48 has a bearing connection. The pin 48 is secured to the beveled gear 41. The beveled gear 41 is carried by the horizontal shaft 49, having bearing 50 formed in the gear casing 18. The shaft 49 is provided with a key and groove construction 51 to prevent axial movement of the shaft 49, and to which access may be had by means of the cover 52 and key retainer plate 52a, held in place by the screws 53. A counterbalance 54 is placed within the casing 18, to equalize the weight on each side of the shaft 17. An oil seal 55 is provided at the upper end of the casing 18.

The beveled gear 40 preferably has an integral extended sleeve 56, which is placed inside of the

cylindrical bearing 57, provided with an outward flange 58. The flange 58 supports the casing 18, which, in turn, is supported on a washer 59, provided with an inward extension 60, resting on shoulder 62 of shaft 17.

The bearing 57 is assembled into gear casing 18 from beneath, and has a rubber-like ring 58a to seal the flow of lubricant at this point. The beveled gear 40, sleeve 56 and washer 59 are assembled from above, and the extension 60 slides down through groove 61 in hollow shaft 17. The gear 40 and sleeve 56 are clamped axially by bearing 45, which has threaded engagement with the shaft 17. A bearing washer 40a may be provided for gear 40 and may be locked thereto at 40b.

The gear casing 18 carries a downwardly depending sleeve 70. This sleeve may be supported by the funnel 71 secured by screws 72 in the casing 18. The rotatable sleeve 70 carries a thrust bearing 73, which in turn supports the spring platform 30 by means of the cylinder 74 welded thereto. The construction is such that the thrust bearing 73 allows the sleeve 70 to turn, while the spring platform 30 remains stationary.

Oil seals are provided underneath the washer 59. These include a cylindrical metal washer 75 having sliding sealing surface engagement with metal washer 76. The washer 76 has an extension 77 fitting into groove 78 formed in an otherwise cylindrical cup 79 which is clamped between the casing 18 and the funnel 71. A rubber-like seal 75a is provided for washer 75. A bellows rubber-like seal 76a is provided for washer 76.

The combined brake and clutch 26, for selecting agitation or rotation, may include stationary brake plate 80 surrounding the shaft construction, and welded on the base 10. A combined brake and driven clutch disc 81, having friction surface 81a, is resiliently carried by the sleeve 70 through the medium of a plurality of spiral springs 82 secured by brackets 83 to the sleeve 70. The disc 81 is normally urged downwardly by springs 82, and normally engages the brake plate 80. An axially movable clutch drive disc 84 is carried by the pulley shaft 14, and is axially movable by the lever 25, which is pivoted on the pin 85 carried by the brackets 86. The lever 25 is provided with upwardly directed ears 87 which engage the outer ring 88 of the thrust bearing 89, whose inner ring 90 is secured to the disc 84 through the medium of a sleeve 91 which is vertically slidable on the pulley shaft 14. The sleeve 91 is provided with an outward flange 92, which receives the upper side of the disc 84. The lower end of the sleeve 91 is provided with a nut 93 to secure the inner ring 90 of the thrust bearing. The upper end of the flange 92 is forked at 95 to receive the pin 96, which allows axial movement of the sleeve 91 and disc 84, but rotationally locks them to the pulley shaft 14. The pin 96 also locks the pulley shaft 14 with the hollow shaft 17. The construction is such that, when the lever 25 is in its lower position, the disc 84 is in its lower dotted line position 84a. When the lever 25 is in its uppermost position, the combined brake and driven clutch disc 81 is in its upper dotted line position 81b. This provides a resilient rotational drive between the pulley 15, the sleeve 70 and the tub 11, when the lever 25 is in its upper position; and provides a braking action for the sleeve 70 and tub 11, while allowing rotation of the hollow

shaft 17, when the lever 25 is in its lower position, to operate the rotary-reciprocating transmission and agitator 20.

The tub 11 includes an outer imperforate cup 100 and an inner perforate basket 101. These are secured together, as by rivets 102. A rubber-like spacer is provided at 103. The outer cup 100 has a central integral funnel 104, to which one end of a flexible bellows 105 is secured. The other end is secured to agitator 20. The bellows 105 prevents the flow of water down shaft 18 into the gear casing.

A cylindrical weight 106 is secured to the tub 11 to reduce the extent of gyration due to unbalanced loads. In lieu thereof the tub 11 itself may be made heavy.

The tub 11 is bolted to the gear casing 18 at 107. The flange 108, of casing 18 extends substantially around the entire circumference and the tub 11 is bolted as at 107 throughout the circumference, except at the bearing 50.

A downwardly extending cylindrical apron 109 is secured to, and depends from, tub 11. It rests over another cylindrical funnel 110, which is welded to water trough 33. The apron 109 and funnel 110 form a water trap which prevents splashing of water down along the shaft construction.

When the tub is rotated water is discharged over rim 111 of the tub. The water is collected by trough 33 and flows down pipe 112 to pump 113, driven by motor 21. The pump 113 discharges through pipe 114, and a hose, not shown, to a suitable drain or stationary tub.

A timer 115 may be provided to control the machine. It may be of any well known construction, either electrically or spring driven. For example, it may be a timer as disclosed in Dyer Patent 2,331,897. A connector line 116 may be plugged into any suitable power outlet. The timer handle 117 may be operated to start the sequences. Power is distributed from the timer 115, at correct periods of time, through lines 118 to energize the motor 21, solenoid 24 and water supply, not shown.

In the operation of the machine, clothes and detergent are placed in tub 11 and the timer 115 is placed in the starting position. A measured quantity of water is introduced into the tub under the control of the timer, as disclosed in my Patent 2,366,236, to the correct level. Then the motor is energized to cause the agitator 20 to reciprocate. Thereafter the solenoid 24 is also energized to raise the lever 25 and discs 81 and 84 and to cause the tub 11 to spin. Thereafter the operation is repeated once or a plurality of times with rinse water. The timer then stops after the final spin operation.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A washing machine comprising: a base; a thrust bearing carried by said base; a pulley drive shaft vertically carried by said thrust bearing; a hollow rotatable shaft secured to and above said pulley shaft; a hollow beveled gear secured to the upper end of said rotatable shaft; a gear casing with a hollow sleeve depending therefrom axially fixed but rotatably carried by said rotatable shaft; said gear being located in said casing a horizontal axis beveled gear rotatably mounted within said gear casing engaging the

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teeth of said hollow beveled gear, the axis of said horizontal beveled gear being in fixed relation to said gear casing; said horizontal axis beveled gear having an eccentrically located bearing, a vertically reciprocable agitator shaft having bearings in said hollow beveled gear and in said gear casing; motion translating means connecting said agitator shaft and said eccentrically located bearing to drive said agitator shaft in a reciprocating motion from the rotary motion of said bearing; and a brake and clutch connection between said hollow sleeve and said pulley shaft.

2. A washing machine comprising: a base; a thrust bearing carried by said base; a pulley drive shaft vertically carried by said thrust bearing; a hollow rotatable shaft secured to and above said pulley shaft; a hollow beveled gear secured to the upper end of said rotatable shaft; a gear casing with a hollow sleeve depending therefrom axially fixed but rotatably carried by said rotatable shaft; said gear being located in said casing a horizontal axis beveled gear rotatably mounted within said gear casing engaging the teeth of said hollow beveled gear, the axis of said horizontal beveled gear being in fixed relation to said gear casing; said horizontal axis beveled gear having an eccentrically located bearing, a vertically reciprocable agitator shaft having bearings in said hollow beveled gear and in said gear casing; motion translating means connecting said agitator shaft and said eccentrically located bearing to drive said agitator shaft in a reciprocating motion from the rotary motion of said bearing; a stationary brake plate coaxial with said drive shaft; a brake and clutch disc resiliently carried by said sleeve and normally engaging said brake plate; and an axially movable clutch drive disc carried by said pulley shaft.

3. A washing machine comprising: a base; a thrust bearing carried by said base; a pulley drive shaft vertically carried by said thrust bearing; a hollow rotatable shaft secured to and above said pulley shaft; a hollow beveled gear secured to the upper end of said rotatable shaft; a gear casing with a hollow sleeve depending therefrom axially fixed but rotatably carried by said rotatable shaft; said gear being located in said casing; a rotatable tub carried by said gear casing; a vertically reciprocable agitator in said tub; a horizontal axis beveled gear rotatably mounted within said gear casing engaging the teeth of said hollow beveled gear, the axis of said horizontal beveled gear being in fixed relation to said gear casing; said horizontal axis beveled gear having an eccentrically located bearing, a vertically reciprocable shaft secured to said agitator and having bearings in said hollow beveled gear and in said gear casing; motion translating means connecting said agitator shaft and said eccentrically located bearing to drive said agitator shaft in a reciprocating motion from the rotary motion of said bearing; and a brake and clutch connection between said hollow sleeve and said pulley shaft.

4. A washing machine comprising: a base; a thrust bearing carried by said base; a pulley drive shaft vertically carried by said thrust bearing; a hollow rotatable shaft secured to and above said pulley shaft; a hollow beveled gear secured to the upper end of said rotatable shaft; a gear casing with a hollow sleeve depending therefrom axially fixed but rotatably carried by said rotatable shaft; said gear being located in said casing; a rotatable tub carried by said gear cas-

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ing; a vertically reciprocable agitator in said tub; a horizontal axis beveled gear rotatably mounted within said gear casing engaging the teeth of said hollow beveled gear, the axis of said horizontal beveled gear being in fixed relation to said gear casing; said horizontal axis beveled gear having an eccentrically located bearing, a vertically reciprocable shaft secured to said agitator and having bearings in said hollow beveled gear and in said gear casing; motion translating means connecting said agitator shaft and said eccentrically located bearing to drive said agitator shaft in a reciprocating motion from the rotary motion of said bearing; a stationary brake plate coaxial with said drive shaft; a brake and clutch disc resiliently carried by said sleeve and normally engaging said brake plate; and an axially movable clutch drive disc carried by said pulley shaft.

5. A washing machine comprising: a hollow rotatable drive shaft; a gear casing rotatably supported and axially fixed on said drive shaft; a hollow beveled gear fixed to said drive shaft; said gear being located in said casing; a horizontal axis beveled gear rotatably mounted within said gear casing and engaging the teeth of said hollow beveled gear, the axis of said horizontal beveled gear being in fixed relation to said gear casing; said horizontal axis beveled gear having an eccentrically located bearing, and a vertically reciprocable shaft having bearings in said gear casing and hollow beveled gear; motion translating means connecting said agitator shaft and said eccentrically located bearing to drive said agitator shaft in a reciprocating motion from the rotary motion of said bearing.

6. A washing machine comprising: a hollow rotatable drive shaft; a gear casing rotatably supported and axially fixed on said drive shaft; a hollow beveled gear fixed to said drive shaft; said gear being located in said casing; a horizontal axis beveled gear rotatably mounted within said gear casing and engaging the teeth of said hollow beveled gear, the axis of said horizontal beveled gear being in fixed relation to said gear casing; and a vertically reciprocable shaft having bearings in said gear casing and hollow beveled gear and having a Scotch yoke connection with the eccentrically located bearing upon said horizontal axis beveled gear.

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